

REMARKS

I. Claim Amendments

Claims 1-8 and 11-15 are pending.

Claim 5 is amended to recite an automated supply system is provided to add the tin pellets to the anode baskets during said plating as supported page 7, line 10.

New claim 12 simplifies some of the language in claim 1.

Claim 13 finds support on page 7, lines 15 – 16 of the specification. None of the cited references appear to disclose such a configuration.

Claim 14 combines claims 5 and 7.

Claim 15 repeats claim 11 but depends from claim 14.

II. 35 USC §112, first paragraph

Claim 8 is directed to the process according to claim 1, wherein a remainder of space, on the front wall, between the moveable edge masks is open to directly oppose the moving strip.

The Office action asserts the portions of claim 8 that are underlined above, were not adequately disclosed in the specification as originally filed.

Applicant respectfully submits the amendment to claim 8, enclosed herewith, overcomes this rejection. The amendment relies on the term "facing the strip" as defined at page 1, line 28 of the application.

III. Claim Objections

The Office action also objects to claim 1, because of minor informalities.

Applicant respectfully submits the amendment to claim 1, enclosed herewith, overcomes this rejection.

IV. 35 USC §112, second paragraph

With respect to claim 1, the Office action asserts "tin anodes" in line 6 appear to be the same as the first and second pairs of tin anodes in claim 1, line 3.

With respect to claim 3, the Office action asserts "the electrolyte" lacks

antecedent basis.

The Office action asserts claim 8 is unclear because claim 1 does not recite “a space” on the front wall, or anything “closed” as opposed to being “open.”

Applicant respectfully submits the amendment to these claims, enclosed herewith, overcomes this rejection.

V. 35 U.S.C. §103

- A. Claims 1-2, 5-8 and 11 have been rejected unpatentable over US 2,719,820 to Allen (hereinafter, “Allen”); in combination with US 4,164,454 to Schober (hereinafter, “Schober”); US 5,582,708 to Delfrate et al. (hereinafter, “Delfrate”); US 4,367,125 to Avellone (hereinafter, “Avellone”); and Sato et al., *Manufacturing of One-side Electrogalvanized Steel Strip with Heavy Coating*, Transactions ISIJ, Vol. 23 (1983), pp. 946 – 953 (hereinafter, “Sato”)

Allen is directed to coating methods and apparatus which combine electrolytic coating with spray coating for coating steel strips with tin or other metals. Allen provides few details regarding the electrolytic coating apparatus and method. At column 1, line 71 – column 2, line 1, however, Allen states, the electrolytic cell 10 comprises a tank 13, conductor rolls 14, a sink roll 15 and anodes 16, which in the present example are tin.

It is respectfully submitted the Office action errs by asserting Allen Figure 1 provides evidence that each anode has a top and a bottom and each anode front wall is closer to the strip it faces at the bottom than at the top. MPEP §2125 states proportions of features in drawings are not evidence of actual proportions when drawings are not to scale. When the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value. See *Hockerson-Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956, 55 USPQ2d 1487, 1491 (Fed. Cir. 2000) (The disclosure gave no indication that the drawings were drawn to scale. “[I]t is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.”).

The Office action also errs by stating it would have been obvious to modify the Allen anodes based on Schober, because Allen makes clear that its anodes are made of tin (or presumably other metals to be electrodeposited). Schober relates to a continuous plating line for plating of metallic strips. The continuous plating line has a modular design and includes a module for continuous electrodeposition of plating material onto the strip. According to column 3, lines 52 – 55, Schober's electrodeposition module includes an outer anode bag or basket 66, preferably formed of titanium (not the metal being deposited) and holding pellets of the metals to be deposited. Thus, no apparent reason existed to violate Allen's teaching that the anodes are to be made of the material to be electrodeposited.

Furthermore, present claim 1 recites each anode has a top and a bottom and each anode front wall is closer to the strip it faces at the bottom than at the top. In contrast, Schober, column 1, line 57 – column 2, line 2, teaches away from positioning the anode baskets such that the bottom of each front wall is closer to the metal strip than the top of each front wall. Schober explains the plating tanks have a novel solution agitation/circulation system, and the direction and distribution of flow of the plating solution permits control of the uniformity and deposition rate of the plating material to counteract the electrical edge effects without need for specifically shaped anode configurations to suit varying strip width and thickness. Thus, upon employing the Schober anode bags or baskets, a skilled artisan had no apparent reason to specifically shape the anode configuration by positioning the anode baskets such that the bottom of each front wall is closer to the metal strip than the top of each front wall.

Claim 1 recites moving the strip vertically downwardly between a first pair of tin anodes facing the moving strip and then moving the strip vertically upwardly between a second pair of tin anodes facing the moving strip, and it recites the elongated edge portions of the wall of the tin anodes are elongated substantially vertically and the elongated moveable edge masks are elongated substantially vertically. Thus, the edge portions and edge masks are elongated generally parallel to the direction of strip travel between the anodes rather than being generally transverse to the direction of strip travel between the anodes.

The Office action errs by asserting Schober teaches edge masks (moveable or not). The Office action cites column 3, lines 52 – 56 and Figure 7. Neither citation discloses edge masks. Column 3, lines 52 – 56 states, “[e]ach side wall has L-shaped mounting brackets 65 to position an outer anode bag or basket 66 ... as well as masks to control plating uniformly, if required.” No further description of the masks is provided.

There is no disclosure that the masks are “edge masks” elongated substantially vertically on the front wall of each anode basket.

Schober stresses the central feed of the plating solution from the conduits 67 and 71 through the stub conduits 69 and 74 to the anode baskets overcomes electrical edge effects (See column 3, line 66 – column 4, line 4, for example). Thus, since the edge effects are overcome the masks would not be edge masks; they would be some other kind of mask. For example, maybe they would have been the transverse masks of Botts (US 5,776,327) that have already been distinguished from the present vertical edge masks.

Delfrate relates to an electroplating cell for the continuous coating of metal strips with a layer of metal alloy. Delfrate explains each anode 3 is bordered along two opposite edges 3A, 3B, by two masks 4A, 4B in the form of narrow plane panels. However, masks 4A, 4B are horizontally oriented and transverse to the direction of movement of metal strip B. This orientation is opposite to the present invention. As discussed above, the edge portions and edge masks are elongated generally parallel to the direction of strip travel between the anodes.

Moreover, as discussed above, a person having ordinary skill would have had no apparent reason to employ edge masks upon employing the anode bag or basket described in Schober.

Avellone relates to an improved *insoluble anode* plating technique, wherein an anode assembly is positioned in relatively closely spaced relationship with the workpiece. This is an example of the DSA system discussed at page 6 of the present application. The technique requires plating fluid to be supplied to a flow path, defined by the anode assembly and workpiece. The plating fluid must be supplied in a quantity sufficient to maintain at least a portion of the flow path across the workpiece

substantially filled at all times with flowing solution so plating is accomplished continuously and uniformly across the entire width of the workpiece. At column 4, lines 24 – 27, Avellone explains, “[t]o insure uniform plating thickness across the width of the strip, masking plates are inserted in the path of solution flow.” The masking plates are to prevent tree growth and edge buildup.

Avellone does not describe or provide any apparent reason to employ moveable edge masks elongated substantially vertically on the front walls of anode baskets. Moreover, as discussed above, a person having ordinary skill would have had no apparent reason to employ edge masks upon employing the anode bag or basket described in Schober. Also, the paragraph bridging Avellone, cols. 3 and 4, requires a uniform gap between the anode and the strip. This is the opposite of the present invention having an anode bottom closer to the strip than is the anode top. Also, the Avellone anode is above and possibly below the strip. Thus, this is a horizontal process and there is no teaching that the reason for using the masking plates applies to the present substantially vertical plating process.

Sato relates to processes developed for manufacturing one-side electrogalvanized steel strips. Thus, Sato’s teachings regarding the use of edge masks are not relevant to two-side electrogalvanizing. Moreover, on page 950, Sato explains, even when edge masks are used, whiskers can grow up on the edge of a strip and it is impossible to completely eliminate the occurrence of whiskers, and therefore, it is necessary to remove them mechanically.

However, as mentioned above, Schober teaches, the direction and distribution of flow of the plating solution permits control of the uniformity and deposition rate of the plating material, thus counteracting the electrical edge effects without the need for specifically shaped anode configurations to suit varying strip width and thickness (See column 1, line 65 – column 2, line 2 of Schober). More specifically, Schober states its central feed of plating solution from conduits 67 and 71 through stub conduits 69 and 74 to the anode baskets overcomes electrical edge effects (See column 3, line 66 – column 4, line 4 of Sato). Thus, a person having ordinary skill would have no apparent reason to employ edge masks with the central feed with the anode bag or basket of Schober.

Furthermore, claim 1 recites the masks are adjustable masking means controlled and guided dependent on strip width and/or tin coating thickness distribution. None of the cited references disclose this.

Claim 5 further distinguishes over the references because none of the references disclose an automated supply system to add the tin pellets to the anode baskets during said plating.

Claim 7 reciting the movement of the edge masks is controlled remotely further distinguishes over the references.

B. The Office action newly rejects claims 3 and 4, citing 35 U.S.C. §103(a); Allen; Schober; Delfrate; Avellone; Sato; and US 5,454,929 to Kinghorn (hereinafter, “Kinghorn”)

Kinghorn relates generally to manufacture of integrated circuit lead frames, and more specifically to a method for preparing a solderable lead frame having several leads including a step of tin plating the leads of a base lead frame. Column 6, line 61 – column 7, line 2 of Kinghorn, referring to Figure 4, describes a tub 26 containing anodes 27 immersed in an electrolyte. The anodes 27 are typically either wire screens or baskets. An anode basket is generally made of titanium screen and contains chunks of metal, such as nickel or palladium, which will be deposited. The anodes are connected to a pulsed or direct current source.

Kinghorn is not cited to compensate and does not compensate for the shortcomings of the combination of Allen, Schober, Delfrate, Avellone and Sato.

C. Dependent Claims Further Distinguish Over the references

Claim 5 further distinguishes over the references because none of the references disclose an automated supply system to add the tin pellets to the anode baskets during said plating.

Claim 7 reciting the movement of the edge masks is controlled remotely further distinguishes over the references.

Claims 11 and 15 recite the longitudinal axis of the moving strip facing the front

wall does not oppose the moveable edge masks. This further distinguishes from the references with masks transverse to strip movement.

New claim 14 recites the features of claims 5 and 7. Thus, it has recites an automated supply system and remotely controlled masks. This unexpectedly improves operability and safety of performing the process.

VI. Conclusion

In view of the above it is respectfully submitted all objections and rejections are overcome. Thus, a Notice of Allowance is respectfully requested.

Respectfully submitted,

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